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Some Arctic Grasses.

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(WITH PLATE III.)

DESCHAMPSIA BREVIFOLIA R. Br. in Parr. 1st Voy. Suppl. p. 291. (1823).—The finding of what we believe to be the typical form of Robert Brown's D. brevifolia, by Lieut. A. W. Greely in 1882, near Ft. Conger, Grinnell Land, latitude 81° 44′, leads us to restore to its specific rank this truly Arctic grass that has been classed by many recent authors as only a variety or form of D. cæspitosa. We do not find it represented in any of the numerous Rocky Mountain collections which we have examined, and the only approach to it among our Arctic collections is a specimen from Schumagin Island, Alaska, collected by M. W. Harrington in 1871–2. The Alaskan plant is about three times the size of the one from Grinnell Land, but in other respects there is no essential difference. The figure we have made is drawn from one of Lieut. Greely's specimens and shows the habit of the plant, natural size, with enlarged illustrations of one of the spikelets.

The following is copied from Brown's description:

Gramen 3–5-unciale, glabrum. Culmi simplicis, erecti, foliati. Folia inferiora involuto-subulata, stricta, uncialis—sesquiuncialis; vaginis strictis, folio brevioribus, ipsa basi integra; ligula lanceolata; supremum brevissimum, vagina elongata, laxiuscula, ligula breviore. Panicula coarctata, lanceolata vel oblonga, fusco-purpurascens, scariosa, ramis semiverticillatis. Locustæ bifloræ raro trifloræ, semper cum rudimento pedicelliformi flosculi alterius. Gluma subæquivalvis, mutica, acuta, valvulis lanceolatis, concavis acutissimis, scariosis disco purpurascenti, limbo pallido, uninerviis, locusta paulo brevioribus. Perianthia subuniformia scarioso-membranacea separatim solubilia, inferius sessile: valvula inferior ipsa basi barbata pilis brevibus strictis, albis, cæterum glabra, concava subquinquinervis, nervis omnibus lævibus, lateralibus obsoletis, apice eroso multidentato, dorso sæpius infra medium aristata; arista setacea, recta, denticulata, valvulam ipsam vix vel paulo superanti; superiore longitudine inferioris, angustior, dinervis, apice bidentato, quandoque semifido.

PHIPPSIA ALGIDA R. Br.—Mr. H. N. Patterson, who is well-known both as a collector and a compiler of useful and neatly printed check-lists of plants, has been spending the season in the Rocky Mountains, gathering in botanical treasures, and among his interesting finds is Phippsia algida, a curious little grass, allied to Colcanthus and Sporobolus, that has not before been discovered south of Alaska. Mr. Patterson collected it in wet, gravelly places about Chicago Lake, Georgetown, Colorado. It may not be so rare within our limits as now appears for its low, moss-like growth and aquatic habits render it very likely to es-

cape notice. Our figure is taken from Trinius, *Icones*, and shows very well both the habit of the plant, excepting that it is densely cespitose, and the minute characters of the spikelets. The outer or empty glumes are very small and the lower one is sometimes wholly wanting.

AGROPYRUM VIOLACEUM, Hornem.—This grass was collected at Ft. Conger, Grinnell Land, by Lieut. Greely and Dr. D. L. Brainard. The specimens are fine, 8–15 cm. high, with short spikes and densely pubescent glumes, a character observed in Greenland specimens collected by Thomas M. Fries. The figure illustrates one of the specimens nearly natural size.

In 1883 Mr. Wm. M Canby collected at the Upper Marias Pass, Montana, alt. 8,000 ft., specimens of this Agropyrum in which the leaves are much narrower than in the Scandinavian plant and pubescent, as are also the floral glumes. The outer glumes are smooth. All the glumes are remarkably broad with very short awns.

EXPLANATION OF PLATE III.—A, *Deschampsia brevifolia* R. Br.; entire plant, nat. size and spikelet enlarged. B, *Phippsia algida* R. Br.; entire plants and details of flowers. C, *Agropyrum violaceum*, Hornem.; entire plant, nat. size and spikelets enlarged.

The Life and Labors of Linnæus.

A. P. MORGAN.

Previous to the time of Linnæus, the science of botany was in a chaotic state. Discoveries there had been, it is true, and the science had made much progress; each discoverer seemed disposed to attach most importance to what he found out himself and proceeded to establish a system of classification upon the particular feature which he had investigated. The method of Cæsalpinus was founded on the fruit, that of Rivinus on the number of petals of the flower, that of Tournefort on the figure of the same. All were artificial because they took into consideration only one or a few features of the plants.

The problem of the great botanists of all times has been to find a natural system, one in which every plant will be shown in its perfect relation to all other plants. With this problem all the distinguished botanists of Linnæus' time were busily engaged. Haller at Göttingen labored doubtfully, sometimes despairingly, over his Prodromus of a German Flora and Enumeration of the Plants of Switzerland. Dillenius at Oxford improved Ray's Synopsis and labored faithfully upon mosses and other plants.

Bernard de Jussieu, while arranging the great Jardin des Plantes at Paris, pondered deeply the problem of a natural system. Botanists of lesser note were all occupied with the same question.

While at the university in Upsala, in 1829, Linnæus was prompted by reading a discourse by Vaillant, on the structure of flowers, to examine very closely the stamens and pistils of plants. These appendages he discovered to be essential to the vegetable and to assume as much variety as the petals; hence he conceived that they might be made the basis of a new system of classification. He thus early laid the foundation of that sexual system which he afterwards wrought up to such perfection. According to this system were arranged all his succeeding botanical observations.

The Linnæan or sexual system is briefly as follows: All known plants are divided into 24 classes, the characters of which are established upon the number or upon the difference of situation or arrangement of the stamens; the orders as far as possible on a similar number, situation or arrangement of the pistils. For example the classes are Monandria, Diandria, Triandria, etc.; stamens and pistils are present in all of the classes to the 23d. The 24th class is the Cryptogamia containing even to this day many plants the mode and organs of whose fructification are not yet ascertained. Linnæus did not publish his system till he went to Holland, in 1735. Having paid a visit to Dr. Gronovius, of Leyden, the latter returned it and saw his Systema Naturæ in manuscript, which astonished him, and he requested Linnæus' permission to get it printed at his own expense. The Dutch botanists received Linnæus with the utmost cordiality and all immediately embraced and adopted his system. He rearranged the gardens of Clifford and Van Royen and assisted his friend Gronovius in the publication of his Flora Virginica, all of which was done upon Linnæan names and principles.

As soon as the sexual system was given to the world Linnæus strove to secure for his method the good will of distinguished botanists elsewhere. He went over to England and visited the learned botanist Dillenius, who at first received him very haughtily; but he afterward detained him a month, and at last took leave of him with tears in his eyes, wishing him to remain with him till his death. He maintained a friendly correspondence with him, though the grim old professor always adhered to the method of Ray, and made labored quotations from John Bauhin and Dr. Plukenet. He had no doubt, he said, that Linnæus would one day overthrow his own system. He gruffly called in question the genus Dillenia, named by Linnæus in his honor, but which

still holds good with nine species of Asiatic plants, and which furthermore has given name to the natural order Dilleniaceæ.

Linnæus received word that the celebrated Prof. Haller, at Göttingen, contemplated writing against his new method. Deprecating this he wrote to Haller the noblest protest that ever man made; from it we may make many valuable extracts. He said:

> I must declare that I am anxious to avoid, if possible, all anger or controversy with you; my wish is rather to act in conjunction with you; I should detest being your adversary, and as far as possible I will avoid it. May there be peace in our days.
>
> I dread all controversies, as, whether conqueror or conquered, I can never escape disgrace. Who ever fought without some wound or some injurious consequence? Time is too precious, and can be far better employed by me, as well as by you. I am too young to take up arms; which, if once taken, can not be laid aside till the war is concluded, which may last our lives.
>
> If my harmless sexual system be the only cause of offense, I can not but protest against so much injustice. I have never spoken of that as a natural method; on the contrary, in my Systema, I have said: "No natural botanical system has yet been constructed, though one or two may be more so than others; nor do I contend that this system is by any means natural. I do not deny that a natural method is preferable, not only to my system but to all that have been invented. Probably I may, on a future occasion, propose some fragments of such a one. Meanwhile, till that is discovered, artificial systems are indispensable."

Haller's reply was cordial and removed all cause for anxiety. He pronounced the report to be false; it had not entered his mind to disturb a young man of so much merit in the science of botany, in the commencement of his fame and fortune.

Linnæus was delighted and very grateful. "I rejoice with all my heart," he wrote, "that the rumor was unfounded, for indeed you and Dillenius are the only people I would not wish to have for adversaries." The life-long correspondence between these two great men is exceedingly interesting.

Before returning to his native country Linnæus went to Paris and visited the Jussieus. Although "they would not stir a step from the method of Tournefort," yet they received him most hospitably and made him very welcome. They showed him their herbaria and that of Tournefort, and the large collection of books belonging to Dr. Isnard. They made excursions to Fontainbleau and Burgundy solely for the purpose of showing Linnæus the finest plants that were to be met with in the neighborhood of Paris. He was elected corresponding member of the Academy of Sciences, and Du Fay proposed to Linnæus to become a Frenchman, in which case the Academy would appoint him one of its members with an annual salary. His correspondence continued with Bernard de Jussieu, who, though continually plan-

ning the natural system, afterward published by his nephew, recommended the works of Linnæus to his pupils and caused them to be published and sold at Paris.

Although the Oxfordian professor held aloof from the Linnæan system, nevertheless it was speedily adopted and put in practice in England and America. His faithful disciples, John Ellis and Peter Collinson, were unwearied in their efforts to promulgate his doctrine. They were rich merchants, actively engaged in trade, and with a love for natural history pursuits. Through their shipmasters they gathered plants from every country in the world and sent them to Linnæus. Their correspondence was extensive, especially with America, and through them Linnæus obtained most of his American plants.

After a while the mighty Solander, one of Linnæus' pupils, was sent to London. He sailed round the world with Captain Cook, and returning to London, laid the foundation of the Hortus Kewensis of his friend Aiton. By his elegant and engaging manners he gained the favor of those high in authority, and overthrew at court the old regime in the person of the great Dr. Hill. When a king's botanist was to be appointed for the provinces Ellis and Collinson secured the place for their friend John Bartram.

Linnæus had several occasional correspondents in America, though most of the plants seem to have been sent through Ellis and Collinson.

His Excellency Cadwallader Colden, Governor of New York, addressed him stately and learned letters from his residence at Coldenham. He favored and assisted the enterprises of his student Peter Kalm, and facilitated his journeys through that part of North America. Linnæus named a genus for him, Coldenia. His daughter was an excellent botanist and had mastered the method of Linnæus. John Ellis writes: "This young lady merits your esteem and does honor to your system; she has drawn and described 400 plants in your method only." She figured and described the Gold-thread. Ellis sent her characters to Linnæus and begged him to call this plant Coldenella.

John Bartram was unwearied in his labors and gathered everything into his garden at Philadelphia that he could lay his hands on. He was much beloved by Dr. Garden, of Charleston, and they visited each other often. When Bartram was appointed king's botanist in America, Dr. Garden appeared to be greatly astonished. He wrote to Ellis: "Is it really so? Surely John is a worthy man; but yet to give the title of 'king's botanist' to a man who can scarcely spell, much less make out the characters

of any one genus of plants, appears to me rather hyperbolical. Pray how is this matter?"

Dr. Garden was a very scholarly man; he was educated at Edinburgh; his letters to Linnæus were addressed in elegant Latin. He practiced medicine at Charleston, S. C., till after the revolution, when, with many other royalists, he felt compelled to return to Great Britain. He attempted twice to penetrate through the wilderness to the Mississippi river, but was compelled to return by the danger arising from the disturbed state of the country. He sent many plants as well as animals to Linnæus through Ellis and directly. He was very anxious to have a plant named for his friend and valued correspondent, Ellisia; he sent specimens and figures of the plant and persisted in his choice a long time. But Linnæus decided that his plant belonged to a genus already established; this was a great disappointment to him. Ellis named the elegant genus Gardenia after him.

The difficulties of shipping plants and sending letters in that day are well illustrated in many of his letters. His letters and packages were captured by the French time and again, and his lamentations are pitiful. He writes to Ellis after one such disaster:

> My grief at my own and your disappointment is inexpressible. A few days ago I heard that both Captain Coats and Cheeseman were taken and with them the two most valuable collections of seeds that ever I could promise or even hope to procure for you. There was every kind that you mentioned in your letter to me and many new and curious shrubs besides. They were all carefully packed exactly as you directed. My patience is gone. I would have given twenty guineas if you had only got one box. I never shall have anything like them again.

The Linnæan system of classes and orders held sway for a hundred years and many people in this country, not yet very old, studied Mrs. Lincoln's Botany. Even after the recognition of the natural system of Jussieu, it was customary to prefix to floras the Linnæan system as a key to the genera. No other such convenient artifical classification of plants was ever invented, and the impetus it gave to the study of plants throughout the civilized world was never equaled. The facility with which the plants of a limited region could be marshaled into regular order was wonderful and young men and women, and old, too, took to the study of botany; it became the craze of the time. Linnæus sent his students abroad and busied himself with arranging under their proper classes and orders the plants from the uttermost parts of the earth. The latest edition of his Systema Naturæ contained more than 1,200 genera and nearly 8,000 species.

It is a singular fact that Linnæus did not at first perceive the

great value of the binomial nomenclature. He established the classes and orders of the sexual system and bent his energies to describing and defining genera with greater precision. He continued to distinguish species by the explanatory phrases of the older botanists. Some examples from the Flora Lapponica will illustrate this. Three species of Violet are named thus:

276. VIOLA foliis cordato-obtusis, pedunculis caulinis.
277. VIOLA foliis cordatis oblôngis, pedunculis fere radicatis.
278. VIOLA foliis subrotundis cordatis pedunculis radicatis.

These species he afterward called Viola biflora, Viola canina and Viola palustris.

The labor of handling these long names is apparent from the following extract from a letter from Dillenius to Linnæus:

In your last letter of all, I find a plant gathered in Charles Island, on the coast of Gothland, which you judge to be *Polygonum erectum augustifolium, floribus candidis* of Mentzelius and *Caryophyllum saxatilis, foliis gramineis, umbellatis corymbis*, C. Bauhin; nor do I object. But it is by no means Tournefort's *Lychnis alpina linifolia multiflora, perampla radice*, whose flowers are more scattered and leaves broader in the middle, though narrower at the end.

The plant, the object of all these maledictions, seems to have been *Gypsophila fastigiata* L.

In 1753 appeared what Haller emphatically termed Linnæus' "maximum opus et æternum," the *Species Plantarum*. To give this work its utmost perfection had been the author's object for many years, and to this all his other botanical productions were in some measure only preparatory, as the rightly ascertaining of species is the great end of all method. It is in this work that Linnæus first employs *trivial* names, as he termed them, which are single epithets, expressive as far as possible of the essential specific differences among the species of a genus, or, in default of these, of some striking and obvious character; not seldom they are local terms or the names of the first discoverers.

Although the Linnæan classes and orders for plants have passed away yet it is wonderful how well the Linnæan genera and species have stood the test of time; this is owing to the remarkable exactness of his descriptions as well as his keen perception of the relationships of plants. Linnæus was accustomed from his earliest youth to put a high value on verbal accuracy and logical precision. He improved the distinctions of genera and species and introduced a better nomenclature on the binomial method. His verbal accuracy and the remarkable terseness of his language reduced the crude matter that was stored up in the folios of his predecessors to a form that was accessible to all

men. The knowledge which he displayed, and the value and simplicity of the improvements which he proposed, secured the universal adoption of his suggestions and crowned him with a success altogether unparalleled in the annals of science.

Notes on the Flora of Eastern Virginia.

LESTER F. WARD.

While engaged in making a geological reconnoissance through the State of Virginia, and as far south as the Roanoake river in North Carolina, during the month of August of the present year, I made a few botanical notes, usually without collecting specimens, except where the plant was doubtful or specially desirable. The terrain to be studied forms a narrow belt, rarely over fifteen miles in width, and extends in a direction slightly west of south from Washington, following the Potomac river as far as Aquia Creek, passing through Fredericksburg, Richmond and Petersburg, from which point it was barely traceable to Weldon, North Carolina. It is the newer or younger Mesozoic of Rogers and Fontaine, or Potomac formation of Mr. W. J. McGee, of the United States Geological Survey, and contains several beds of fossil plants which were the special object of my investigations.

My familiarity with the flora of Washington and vicinity rendered it both easy and interesting to note the more conspicuous changes which the flora undergoes in passing southward, and my notes were almost wholly confined to this aspect of the question. They were usually taken from the carriage, without stopping to make special researches, and it is therefore very evident that the species enumerated below can form only a small part of the whole number, which a thorough investigation of the localities named would show to exist as marking the differences between the flora of those localities and that of Washington. It was, moreover, impossible to note the absence of Washington species, although in a few cases this was quite conspicuous. Where species rare at Washington became common, the fact was noted as well as that of the appearance of entirely new forms. The arboreous vegetation, as being the most striking as well as the most important, naturally claimed special attention, but the more humble forms were not overlooked. Meager as my notes are, however, I find it necessary to omit many minor points, in order to restrict this article to such limits as I presume to be suitable to the pages of the GAZETTE.

I was much interested in the specimens seen of *Quercus Michauxii* Nutt., which, indeed, occurs near Washington, but very sparingly and in such doubtful forms that I had almost felt obliged to apologize for its introduction in the Flora of Washington. The most northerly point at which typical specimens were seen was on Powell Run, the first stream north of the Quantico. Here a fine tree was found, and fruiting specimens collected. Some of the lower leaves are scarcely distinguishable from those of Q. Prinus, while the upper ones show considerable analogy to those of Q. bicolor, to which species the tree is, of course, most closely allied. In the valley of the Pamunkey, near Hanover Court House, this species is very abundant, and the trees attain a great size. The resemblance to Q. bicolor is less close, the leaves not being at all lyrate or whitened underneath. After a thorough examination of it from this point southward, I conclude that while Dr. Engelmann certainly had some grounds for uniting it with Q. bicolor as a variety, there are still better ones for keeping it distinct.

The behavior of the pines furnished a constant subject of observation. Besides the rare Pinus pungens, not seen further south, the only pines thus far met with in the Washington flora are P. mitis, P. rigida and P. inops. These are about equally abundant, except that where any considerable forests of pine occur, they are always composed almost exclusively of P. mitis. A very large part of eastern Virginia and North Carolina, probably one half of the territory, is grown over with pines. The land has been once under cultivation, but long abandoned, and the forests often consist of large trees, between which in many cases the furrows are distinctly visible. In the vicinity of Washington, and especially in Maryland, P. rigida plays the *role*, to a considerable extent, of an "old field pine," but P. inops, the scrub pine, grows in similar situations. As one proceeds southward both these species grow more rare, P. rigida almost completely disappearing before the Rappahannock is reached. It was in the vicinity of Fredericksburg that I saw the first traces of the long-leaved pine, P. Tæda.. These appeared in the form of occasional young growths around the margins of groves of P. mitis. It is a singular fact that the leaves of these small bushes or trees were much shorter than the normal length for the species, while, as I have always observed, the leaves of young trees of P. mitis are generally longer, often considerably longer, than the normal length. The effect was to obscure the fact of the gradual appearance of the former species. One might almost think that a partial hybridization was going on. Nowhere on

the Rappahannock did I see a cone-bearing tree of the long-leaved pine, but there can be little doubt that sufficient research would reveal a few from which the seeds had come that produced the seedlings observed. A little further south, however, after crossing the Massaponax river, such trees began to be seen. They first occurred around the edges of yellow pine forests, as if struggling for admission, next as encircling borders to such forests, a few trees penetrating some distance inward. Still further southward the obvious struggle between the two species becomes more fierce, but to the evident disadvantage of P. mitis. The Tædas close in and share the ground equally, the margins of woods consisting entirely of them. Finally, as we approached the James and Appomattox rivers the yellow pines had generally disappeared, and the timber consisted almost exclusively of P. Tæda. It was only where this was the case that this species assumed the character of a distinctively "old field pine." I had expected to see it come in as such, but this was not the case. In these more southern districts, however, where vast forests of it exist, loblollies, having the typical form of top, stand out in the old fields with all the characteristics that are so often described. But it is proper to say that within the forests this tree presents none of these characteristics. It is tall, straight and symmetrical, having none of the small horizontal limbs, so characteristic of P. mitis, growing from the lower part of the trunk of the smaller trees. The trees when large stand well apart, the interspaces being devoid of shrubby undergrowth, and the appearance of one of these older forests is highly imposing. It is almost the only pine of this part of southern Virginia and northern North Carolina, no specimens of P. australis having been met with. It is also the only species of pine I have ever seen in the Dismal Swamp where it penetrates to Drummond Lake.

Ulmus alata, the winged elm, was first seen on the South Anna river, but it soon became common and remained so to the Roanoake. On the Chickahominy, James and Appomattox it is a small tree, but the specimens planted in the state capitol grounds at Richmond have attained a large size, and form graceful shade trees. The largest trees seen were in the valley of Fontaine's creek, near the state line, some of which had a diameter of nearly two feet.

Quercus aquatica was very closely associated with the last, being first seen near Ashland, 17 miles north of Richmond, and becoming more abundant southward. The foliage is quite constant, being even less variable than that of most oaks. It is entirely different from any of the forms of Q. heterophylla that I

have ever seen, and I can not admit for a moment that the latter is a form of it.

The above are the principal trees in the range of which I was specially interested. The following herbs and shrubs either rare in or absent from the Washington flora were noted and may convey some idea of the unceasing interest and pleasure which a botanist must derive from a journey through that part of the south.

Rubus cuneatus, rare near Washington, steadily increases in abundance from the Accotink to the most southerly point reached, gradually supplanting R. villosus, and becomes very rare in southern Virginia. The berry, which is scarcely edible further north, becomes plump and very sweet, and on several occasions our party halted to enjoy a feast of them from the bushes. In the valley of the Nottaway river this species has the habit of the northern blackberry and forms dense brambles along the fences, some of the bushes growing to the height of six or eight feet.

Nelumbium luteum has never been found in a wild state near Washington, but does well in artificial ponds. I was surprised, therefore, rather by its abundance than by its presence in the Quantico creek. This estuary, as well as that of Aquia creek, is filled with it, and as we happened to be there at the right season to see it in flower, we enjoyed a grand sight. It is perfectly well known to the inhabitants of this part of the state by the name of *Wankapin* (if this is the correct spelling), the first vowel having the same sound as in *want*. As it is the Water Chinquapin of other localities one might surmise that this name was a contraction of the latter, but no one knows it by this more accepted name and it is more probable that Wankapin is an original Indian name. This plant, so abundant in the tidal estuaries of the Potomac, was not seen in those of the James or Appomattox, nor did we meet with it at any inland point on our route.

Liatris squarrosa was found at Brooke Station below Aquia creek and numerous points further south.

Helianthus atrorubens occurs some distance north of the Rappahannock and from this point to the Roanoake it was common, often abundant.

Phragmites communis was seen on the Tapony, six miles above Bowling Green, also near Chester, twelve miles south of Richmond, and again on the Meherrin

Eupatorium fœniculaceum first appeared in the vicinity of Stafford Court House and became a constant companion throughout southern Virginia.

Vitis vulpina, of which a single vine was seen near Mount

Carmel Church, was rare at Fredericksburg, but soon became common and is the principal grapevine of the South.

Chrysopsis graminea, first seen on the Tapony, above Bowling Green, side by side with the more northern species, C. Mariana, gradually takes the place of the latter as you go southward, until from Richmond on it becomes very abundant and almost omnipresent.

Clethra alnifolia, although it extends much further north and has lately been found north of Washington, near Bladensburg, Md., was not encountered until we reached the tributaries of the Mattapony. From here it rapidly grows abundant and in southern Virginia often lines the roadside for miles. As we happened to strike it in its best flowering state we had an opportunity to enjoy the fragrance as well as the beauty of its flowers.

Clitoris Mariana, which is a rarity here and is much sought by lovers of wild flowers, was found at Milford Station blooming in wild profusion along the railroad and in the fields and meadows, where it climbs up the tall weeds and stalks of corn. It was found in the same abundance at nearly all points along our route to Weldon, North Carolina.

Sabbatia lanceolata was collected near Ashland, about seventeen miles north of Richmond. It was seen at one or two more southerly points.

Rhynchospora corniculata was found literally filling small, partially dried ponds at two points south of Richmond, one only five miles from that place, the other near the Rowanty creek, twenty miles south of Petersburg.

Bignonia capreolata was first seen on the James near the Dutch Gap canal. It was common enough there to be known to the inhabitants, who call it the Quarter-vine, from the fact that by a little twisting the stems will cleave longitudinally along the planes whose cross-section gives the well-known "cross" which has caused it to be called the "Cross-vine." I found by experiment that this was the case, and if it has not already been done, the peculiar character of these specialized medullary rays would undoubtedly well repay a careful investigation. The plant was still more common further south.

A small patch of the northern Myrica asplenifolia was found at Ware Bottom Mills, on Trent's Reach, the great bend of the James that was cut off by the Dutch Gap canal, and I thought this southerly position remote from mountains somewhat remarkable and worthy of record.

Diodia Virginica was first seen at the point last mentioned, below which it grows more abundantly.

Silphium compositum was observed near Swift creek, about six miles north of Petersburg, and became abundant on Stony creek and between the Nottaway and the Meherrin. As this species has not been previously reported north of the southern boundary of Virginia this constitutes a considerable addition to its northward range. It is so abundant all through the southern half of Virginia that it is strange that this fact should have remained so long unknown, and this and many other things indicate that very little botanical work has been done in this region.

Polygala Curtisii, var. pycnostachya was found at various points; near Swift creek, at Jarrat's, below the Nottaway (where good albinos were collected), on Three creek, etc. It proves to be a very common form and to range far southward. I have a specimen from Capt. John Donnell Smith, collected at Buck Forest, Transylvania county, North Carolina, and another from Dr. Chas. Mohr, collected by E. A. Smith, at Mobile, which, though labeled "P. fastigiata??," can be none other than our plant. Dr. Mohr suspected as much and wrote on the label "caruncle sparsely hairy, as long as the stalk, but different in the *persistent* bracts. Is it Curtisii?"

Aster gracilis was seen five miles north of Petersburg, and at several points between the Appomattox and the Roanoake. It grows in sandy, open ground in small dense patches, its habit being much that of a Sericocarpus, closely resembling S. solidagineus, except in its blue flowers. It agrees perfectly with Martindale's specimen from the New Jersey pine barrens, which is the only one I had seen.

Passiflora incarnata was not observed north of Petersburg, but at that place it is quite common, and in the valley of the Nottaway it becomes a weed of the cornfields injurious to the crops. It was still flowering abundantly towards the end of August, and was also in full fruit. The inhabitants know it by its fruit as "maypops," and do not understand the term "passion flower."

Paspalum Floridanum was found at points a few miles both above and below the Appomatox, and also on the Nottaway growing very tall (five to six feet) and stout. It seems to follow the cotton and pea-nut ("goober") belt of low sandy country.

Spiræa tomentosa was collected near Jarrat's below the Nottaway, and not elsewhere seen.

Parthenium integrifolium was common from above Rowanty creek to the Roanoake.

Sarracenia flava was found and pitchers brought to me by

Mr. W. J. McGee, of the party, from a swamp in a pine wood, two miles north of Rowanty creek.

Jatropha urens, var. stimulosa, becomes a common plant from the Rowanty creek southward.

Tephrosia spicata was found at Bolling's Bridge, over the Nottaway, as a kind of vetch in the fields.

Desmodium strictum, one or two young flowering plants, was also collected in the vicinity of Bolling's Bridge.

Breweria humistrata was found on the Nottaway, in a dense pine wood, trailing and climbing over the smaller undergrowths and blooming profusely, a delicate and handsome vine.

Elephantopus tomentosus, which replaces E. Carolinianus of the northern districts, was first seen in the Nottaway valley, and became quite frequent as we traveled southward.

Cyrilla racemiflora was first seen on Falling Run, about three miles south of Hicksford, and once more near the state line in North Carolina. It was unfortunately then (August 18) out of flower.

Pluchea camphorata was seen between the Meherrin and Fontaine's creek.

Arundinaria macrosperma, which occurs sparingly on the Nottaway, forms a constant feature of the low ground along Fontaine's creek, near the state line, and is abundant from that point southward.

The principal new forms noted in North Carolina, which were not seen in Virginia, were Senecio tomentosa, Baptisia villosa (in fruit), Carex glaucescens (I once collected this at Norfolk, Va.), and Amorpha fruticosa.

After our return to Washington, the reconnoissance was extended to Maryland.

Eupatorium serotinum, which has never been found in the District of Columbia, is one of the most abundant plants along the Patuxent, above and below Marlboro, a distance of less than twenty miles.

Centrosema Virginianum was also found growing in the deep sands that now cover the wide tract east of the Patuxent, across which the bed of that stream has been shifting since the tertiary epoch.

BRIEFER ARTICLES.

Anemonella thalictroides Spach, Hist. Nat. Veg. vii. 239.—We adopt this genus and Spach's name for it. The little plant has given much trouble, having the leaves of a Thalictrum, except that the cauline are whorled-involucrate, the only point in which it really accords with Anemone, while the terminal depressed-sessile stigma is foreign to both these genera. Spach is the first to characterize the genus, though even he did not rightly describe the stigmas; and his name is excellent. Much earlier than this, F. Hofmeister, in the Regensburg Flora, gives the names *Syndesmon thalictroides* and *Syndesmon tuberosum* as imposed by Count Hofmannsegg, but no character is indicated, and the two plants are not of the same genus. The latter species is one of a group of Asiatic and European species of Thalictrum (§ COROLLINA of Boissier), which, indeed, have large and petaloid sepals and short erect stamens, but all have the unilateral stigma of Thalictrum. This is as true of *T. orientale* Boiss., as of the rest, which this author well describes as with "*stigmate oblongo recto*," but Lecoyer incorrectly as with "*stigmate minutissimo*," probably from the fruit. We await the concluding part of Lecoyer's monograph of Thalictrum, which should give some needed explanations. The first part is in Bull. Soc. Roy. Bot. Belg. xxiv, 1885. On page 223 it describes T. anemonoides as with "*stigmate minutissimo punctiformi*," which applies only to the remains of this organ upon the fruit; but the next page comes nearer to the mark with "*stigmate ordinairement sessile, disciforme, disposé presque horizontalement au sommet de l'ovaire.*" Then it is large and broad.

We may note that the specimen which M. Lecoyer describes at the close of his account of the above species, "*dont les caractères distinctifs ne concordant pas*," no doubt belongs to Isopyrum biternatum.—A. GRAY.

Edmond Boissier.—M. de Candolle has just published a biographical sketch of this distinguished botanist, who died the 25th of last September, at his country residence in Switzerland. Dr. Gray has also given a brief outline of his life and work in the *Am. Journal of Science* for January. Both of these gentlemen knew Boissier personally, and none could be more competent to speak of him. He was born in Geneva the 10th of May, 1810, of a family from whom he inherited an independent fortune. Instead of devoting his life to luxurious idleness, he determined to enter upon some profession, and being in Geneva, with the De Candolles, it was but natural that his choice should fall upon botany. His attention was directed entirely to systematic work, chiefly in the region of the Mediterranean and the East. In 1837 he collected in Spain, and between 1839 and 1845 he published his *Voyage Botanique dans le midi de l'Espagne*, two quarto volumes, containing 180 plates. In 1842 he traveled with his wife in Greece, Syria and Egypt. In 1849, while traveling in Spain, he lost his wife from typhoid fever, and the rest of his life was spent in the shadow of this sorrow and afflicted by his own bodily ailments. Between 1842 and 1855 appeared his *Diagnoses Plantarum Orientalium Novarum*. In 1845 was completed his monograph of *Plumbaginaceæ*, while in 1862 appeared his great monograph of the genus *Euphorbia*, published in De Candolle's Prodro-

mus. In 1866 he published his *Icones Euphorbiarum*, containing 120 folio plates. His great work was the *Flora Orientalis* (1867 to 1884), in five octavo volumes, embracing a region extending from Greece and Turkey to the first cataracts in Egypt, and eastward to the borders of India. The work was entirely completed, and at the time of his death he was preparing a supplementary volume containing recent discoveries.

He was a great traveler, visiting Europe from Norway to Spain and the Crimea, and also much of the East. His last trip was to Spain in 1881, his eighth visit, his first botanical trip having been to the same region more than forty years before. And so the older botanists, the pioneers, are gradually departing, but their names will always be familiar to us as we endeavor to build a superstructure worthy of the foundation they have laid so well.—J. M. C.

Sections of native woods.—Probably the most perfect collection of our native woods is the magnificent series in the American Museum in Central Park, New York City, known as the "Jesup collection." The amount of money expended in gathering this collection was not less than $150,000. Truncheons from this collection, which was carefully named by Dr. Charles S. Sargent, have been placed in the hands of Mr. Charles W. Spurr, of Boston, a well-known manufacturer of veneers, who has cut from them a few sets of thin sections which are now offered for sale.

These sets are certainly unique. Each represents about 200 species of native trees. Where the nature of the wood has permitted, transverse, tangential and radial sections have been cut of each. These sections vary in thickness according to the grain and character of the block from one one-hundredth to one two hundred and fiftieth of an inch. Each section is placed between thin sheets of mica, and mounted in flexible wood frames. Each frame consists of two layers of curled maple veneer backed by strong paper, and varnished with shellac. On the frame is printed the name of the individual or institution purchasing the set, a number corresponding to the specific name in Sargent's *Woods of the Jesup Collection*, the scientific name in full, the common name, the direction of the section and the name of the preparer.

One can hardly realize the time and patience represented by this work. The sections were cut with a 3-ton veneer-machine, which had to be adjusted for the cutting of each block and sometimes for the different parts of even the same piece. In all nearly 18,000 separate sections had to be handled and laid carefully between blotting paper. Add to this the preparation of the woods for cutting, the care necessary to prevent confusing the sections from the numbered truncheons, the making, finishing and printing of the frames, and the mounting of the sections, and we have a truly appalling amount of work. No such series has ever before been made and probably no one else will ever have opportunity or patience to prepare another. The sections prepared and mounted as they are, are exceedingly valuable for the study of the nature and character of the various native woods. These sets, by reason of their completeness, accurate naming, elegant and durable mounting, are unequaled, and a rare opportunity is thus offered to educational institutions which they ought not to be slow to avail themselves of. The price is certainly very reasonable.

The tumble-weed of the West.—In this plant we have an excellent illustration of the effect of climate upon the physical development of the plant body. In the east it is the familiar Amarantus albus, and so far as I have observed never shows any tendency to take upon itself the "tumbling" habit, but grows into an irregularly branching plant which remains fixed to the ground long after it dies at the close of the season. Upon the plains and prairies of the west, however, it grows into a compact plant, with stout curving branches, of such length and curvature as to give to the whole an approximately spherical form. The autumn and early winter winds break off the main stem near the root, and away the whole goes rolling, tumbling and bounding over the ground, often for miles. In Coulter's *Rocky Mountain Botany*, by an accidental transposition of type, the related A. blitoides is called the "tumble-weed." This latter species is, however, a prostrate plant, reminding one of the familiar purslane, and does not take the spherical form necessary to the "tumble-weed."

It may be interesting to note in this connection that upon the steppes of Russia, north of the Black Sea, an entirely different plant becomes a veritable "tumble-weed." Henfrey, in *The Vegetation of Europe*, thus describes it: "One curious plant of the thistle tribe has attracted the notice of most travellers, the 'wind witch,' as it is is called by the German colonists, or 'leap-the-field,' as the Russian name may be translated. It forms a large globular mass of light wiry branches interlaced together, and in autumn decays off at the root, the upper part drying up. It is then at the mercy of the autumn blasts, and it is said that thousands of them may sometimes be seen coursing over the plain, rolling, dancing and leaping over the slight inequalities, often looking at a distance like a troop of wild horses."

On the island of Martha's Vineyard, Mass., the wild Indigo (Baptisia tinctoria) grows into a globular form, breaks off at the root in the autumn, and tumbles about much like the genuine "tumble-weed" of the west.

C. E. Bessey.

EDITORIAL.

Much has been said in the Gazette about teaching botany, and it may be thought that the chief end of botanical study is teaching, but much as we would exalt the teacher's profession there is another work for the professional botanist. If teaching botany is all, what is to become of the science? Are we to teach the same things over and over again, with an occasional new inspiration wafted across from the German laboratories, and simply raise up teachers to follow in our footsteps? Unfortunately, in this country the professional botanist is almost of necessity a teacher only, with his time fully occupied in the drudgery of the laboratory and lecturing upon the very rudiments of his science. If our endowments for botanical teaching have not now secured us a perennial succession of teachers, then has all our teaching been in vain. What we now need is endowment for botanical research, that our country and our botanists may do themselves credit. This does not necessarily mean a great

outlay of money, but simply a supply of trustworthy assistants for teaching, that the professor may have ample time for research. Time is what is needed vastly more than money, and when our boards of control begin to appreciate the reflex influence of original investigators upon our whole system of education, they may see the wisdom of the necessary assistants. It is not to be expected that we can soon emulate foreign countries in the matter of opportunities for original research, but it is a thing that our well-equipped universities should begin seriously to consider, and the first and most practicable step is to give professors more time for special work. Furnishing cheap or temporary assistants will not answer the purpose, but they should be of such proficiency that if desirable the entire work of instruction can be left to their care. In several universities we could mention, an abundance of material is stored up, with all needed accessories of library and apparatus, only waiting for time to become productive. The amount of dead capital laid up in such equipment in this country is astonishing. In such cases, an endowment for botanical research would mean simply a sufficient outlay to pay a reasonable salary to a competent assistant.

Of course many professors have neither ability nor inclination to pursue original investigations, and for such we make no plea. But there are some who have already shown their ability and desire in this direction, in spite of many other time-consuming duties, and it is for such that we urge a more liberal allotment of time. It has been said that our boards of trustees can not be made to understand that anything is needed in a university except teachers and equipment for teaching, but we have just that faith in the growing intelligence of our people, which leads us to believe that we will not long be without some such provision as we have suggested.

THE NEED OF giving careful heed to the work of German botanists, both of to-day and of earlier times, is illustrated anew by the experience of Dr. Bessey, who informs us that he finds in a German work just at hand that the adventitious character of the inflorescence of Cuscuta glomerata, discovered by him, and brought to the attention of the American Association a year and a half ago, and thought to be a new fact by all American botanists, has been known across the water for some time. He will have something further to say in regard to the matter in the March number of the *American Naturalist*. This case, which happens to an eminent investigator whose extensive knowledge of German botanical literature is well attested by his writings, gives us the opportunity of saying that we have been long inclined to think that not enough attention, as a rule, is paid by our less advanced workers to the historical study of the subjects they may have in hand. We do not overlook the fact that few have the ample library facilities afforded the German student. Much can be done to remedy this disadvantage, however, by purchasing the separate papers which most authors now have printed, and which can be obtained by mail through foreign dealers.

THE STRIKING similarity between parts of the biographical sketch of Dr. Gray, published in the January GAZETTE, and the account of his life, from the

pen of Dr. C. S. Sargent, published in the New York *Sun* of January third and reprinted by the author in pamphlet form, makes it necessary for us to say, in simple justice to the GAZETTE, that our article was sent to the printers on December 23 and the proof of it corrected and returned before we had seen Dr. Sargent's paper. The reader of the two will notice that the GAZETTE's sketch is much fuller in its account of Gray's early life, while Dr. Sargent's contains a much more extended history of his botanical labors. Having both had access to the same source for our facts the two papers naturally agree closely in some points while at the same time they supplement each other.

THE EDITORS OF THE GAZETTE intend to make their June number one for collectors. This will include not only directions for collecting and preserving all forms of plant life, but all the details of herbarium work. Many specialists will furnish notes pertaining to their own departments, but this early notice is given, with the request that all collectors in every department and all herbarium workers send us notes concerning the collection, transportation, preservation, and final arrangement of plants. The coöperation of botanists will make this number a valuable collector's hand book.

THE PORTRAIT of Dr. Gray, which we published in our last issue, was made from a photograph taken in 1880. It was selected by Mrs. Gray from the numerous ones in her possession as being the best likeness of the Doctor.

OPEN LETTERS.

Some Variations.

In July, 1885, I collected, in Somerset county, Maine, several specimens of Botrychium matricariæfolium, in which the fertile segments were more compound than in the usual forms, and the sterile segments were smaller, especially narrower, and had sporangia around the edges. Curious looking specimens when compared with the ordinary forms beside which they grew.

In August, at Wenscott Reservoir, R. I., I collected a handful of Monotropa uniflora, one specimen of which had seven petals, twelve stamens, and a six-celled ovary; another had six petals, thirteen stamens, and a six-celled ovary. Several other specimens had some of the parts slightly multiplied, but not so much as these two.

Providence, R. I. — J. FRANKLIN COLLINS.

Botany at Harvard.

With your permission I should like to explain the statement made on page 397 of the GAZETTE for December, as I understand that some readers have been puzzled to understand why the cryptogamic laboratory of Harvard University is separated from the phænogamic laboratory and united with the zoological department, as appears to be the case from the statement in the GAZETTE. One of the elective courses in the college is called elementary biology, and in that course the rudiments of both botany and zoology are taught by the study of a few types, a plan pursued in several colleges of the country. This course is given in a large-sized laboratory at the Agassiz Museum, and the zoological portion is taught by Prof. Faxon, while it is my duty to teach the

botany, which includes not only types of cryptogams, but also of phænogams. This is properly the biological laboratory so-called, and the cryptogamic laboratory is in an adjoining room, in which the large collection of thallophytes, together with an illustrative herbarium of higher cryptogams and phænogams, is deposited. In this room all the special cryptogamic work is done with collections and books at hand. During half of the college year general work on cryptogamic botany is taught at the laboratory in Harvard Hall. I am led to make this explanation lest some of your readers may otherwise infer that the botanists of Harvard believe in keeping cryptogamic botany distinct from phænogamic botany. The contrary is true, and no one would be allowed to take the courses in cryptogamic botany proper who had not previously passed a satisfactory examination in phænogams.

Cambridge, Mass. W. G. FARLOW.

CURRENT LITERATURE.

Revision of the Canadian Ranunculaceæ. By Geo. Lawson, Ph. D., LL.D. From Trans. Roy. Soc. Canada, ii, pp. 15–90. 4°. 1884.

In this extended paper on plants of a single order the author has treated very fully of the synonymy, description, geographical distribution and local occurrence of each species known to have been found in Canada. In instances where doubt exists respecting the validity of a species' claim to recognition, he has entered into a discussion of historical data in regard to it. This paper was preceded by a similar one published in 1870, and embodies the results of riper study, and the additional information secured through private collectors and the Canadian Survey. The extent of the labor involved in its preparation may be inferred from the fact that the index contains 418 different names of the plants embraced in the paper, of course including synonyms. The work will prove valuable to all students of the North American flora, and particularly so to those of Canada, for whom it is specially designed.

Dr. Lawson is author of a number of other botanical papers on the Canadian flora, especially in reference to several rare plants, including Calluna vulgaris, Sedum Rhodiola and others.

Manual of Rocky Mountain Botany. By John M. Coulter, Ph. D., Professor of Botany in Wabash College. Ivison, Blakeman, Taylor & Co. New York and Chicago, 1885. 8vo. pp. 452, and a glossary.

This volume is one of a botanical series published by the above-named firm. Of course we expected to find the press-work, paper, and binding satisfactory, and the expectation is fully met. It is, however, in some respects unfortunate that so close a conformity to a style adopted years ago was adhered to.

It is to be hoped that we shall have a complete flora of North America from the master, who has so long had this great task before him. The continued influx of new species must make his labor appear like the hopes of Tantalus. A volume containing all our known species requires to be supplemented almost as soon as the printer's ink is dry.

To-day, no single book, or series of books, can be designated as the Flora of North America. It must be years before any such can be produced. It was a graceful thing on the part of Professor Gray to suggest the preparation of this Rocky Mountain Manual to Professor Coulter. *Truly it meets a want*; and will leave the dwellers in the region between the 100th meridian and the western slope of the Rocky Mountains, on one hand, and between the latitudes of Southern Colorado and British Possessions, on the other, without excuse for remaining ignorant of their own flora.

The contents of the book might be outlined in tabular form, thus—

	Genera.	Indigenous species.	Varieties.	Introduced species.	Species likely to be found.
Polypetalæ.....38 Orders	184	613	59	11	4
Gamopetalæ .....23 "	181	662	149	9	?
Apetalæ.....14 "	49	166	26	3	1
Total Dicotyledons....75 Orders	414	1441	234	23	5
Monocotyledons .....13 "	104	344	49	7	7
Gymnosperms..... 2 "	6	16	6	0	?
Vascular Cryptogams.. 7 "	19	44	3	0	2
Total.....97 "	543	1845	292	30	14

The 30 introduced species are divided among 11 genera. These added to the 543, would bring the entire number of genera up to 554.

Approximately, we may estimate the area covered by this manual at 460,000 square miles. When we remember that Chester county, in Pennsylvania, with but 738 square miles, has an indigenous flora of nearly 1,200 species, it serves to bring out strongly how little, even in favored regions, mere area has to do with the number of specific forms a flora may contain. Another interesting fact as bearing upon introduction of plants is, that while Chester county has probably not less than 200 introduced species which have obtained a hold, Professor Coulter's region, vast as it is, has has thus far but 30. These figures may be useful in future as showing relation of increase to time and commercial avenues, though being mostly more or less vile weeds, the west can certainly desire no increase of the number thus brought in.

Leaving the state of Michigan from the area embraced by Gray's Manual, it will then be found that Coulter's Manual covers nearly an equal surface. Considering how widely different, in the main, these floras are, it is interesting to note, that Gray describes 85 genera and 345 species of Compositæ, while Coulter has 87 genera and 354 species. Of Orchids there are nearly four times as many species in the eastern as in the western region. Including his solitary "addendum," Coulter gives 88 species of Carex, while Gray's Manual has 151. Our region is richer both in genera and in species of Coniferæ than that of the Rocky Mountains. Touching the south-western hot belt, it is not surprising to find Professor Coulter's region so well represented in Cactaceæ. We have more genera and fewer species of Leguminosæ than the western area now considered. Of course Oxytropis and Astragalus explain this.

In area, Nevada and Utah, whose flora Mr. Watson has described, is to that of Professor Coulter's range *about* as 2 is to 5. At the date of his publication (1871), Mr. Watson enumerated in his field, west of, but adjoining the Rocky Mountain region, 1,235 species, representing 439 genera and 84 orders.

The Rocky Mountain Manual merits a much more extended notice than the space permits. It must be said, however, that it is destined to mark an educational era for that portion of our country. Two months ago there was not a single volume to be had which enabled practical botany to be taught there in the schools. Now there is one of the very best character—concise, but full enough and thoroughly reliable.

It is true that here and there one detects an oversight. Thus we find Leu-

campyx in the text and Leucocampyx in the index. The use of a single paragraph for genus and species both, when there is but one of the latter, mars the appearance of the page. Hence we do not like it. It is a deviation from plan, and slight as it is, will prove an annoyance to the teacher, who is always troubled to keep these distinctions before his pupil. It is all the worse, too, that this want of uniformity does not run throughout the volume after it was started. Compare Anaphalis with Melampodium.

Gymnospermæ are placed where they should be—after the Monocotyledons. Abolition of the Spadiceous, Petaloideous and Glumaceous Divisions in the key is good; as one is no longer called upon to apologize, before pupils, for the appearance of Juncus in the second and its absence from the third of these groups.

There is, we think, a serious oversight in failing to give an artificial key to the Tubulifloræ in Compositæ. The order is, in general, considered by students difficult, if not unapproachable, but with such a key as is found in Gray's Manual these difficulties vanish after a few lessons. True such keys do not teach affinities, but they are very likely to lead to a desire to know more about them.

Prof. Coulter deserves not only the gratitude of his botanical brethren, but also that more substantial recognition from educators which results in prompt and large sales of needed and meritorious books. The call for a new edition can only be a matter of a short time. J. T. ROTHROCK.

Zur Morphologie und Biologie der Niederen Pilzthiere (Monadinen), zugleich ein Beitrag zur Phytopathologie. Von Dr. W. Zopf. Veit & Co. Leipzig, 1885. 4°. pp. 45. 5 col. plates.

This is an important contribution to or rather against the monera theory. It consists of a careful and keen study of the biological changes in the life of ten species belonging to the genera Vampyrella, Protomonas, Diplophysalis, Pseudospora, Aphelidium and Gymnococcus. These are representatives of the lowest forms of the protozoa, and lie upon the debatable ground between animals and plants. Most English biologists place them in the animal kingdom, just below the amœba. Zopf has classed them with the Myxomycetes in his work on *Pilzthiere oder Schleimpilze* (see this journal, vol. x, p. 332). Hæckel set them apart in a group he called the "monera" (see his History of Creation, Studien über Monera, or Leidy's Rhizopods of N. A.). The characters and relations of the monera are very well stated by Packard in his *Zoology* (p. 18). The work before us, however, touches only incidentally upon their general relationship, dealing more especially with their morphology and biology.

The monera, according to Hæckel and subsequent writers, are characterized by the simplest organization, consisting of undifferentiated protoplasm without nuclei or vacuoles. It was Zopf's good fortune to come across a fine quantity of Vampyrella among some fresh-water algæ, and he took the occasion to test the correctness of the diagnostic characters by a critical study of their structure and changes. He first treats of *V. vorax* Cienk. A very large specimen of this readily shows a border of weakly refractive protoplasm, free of the minute granules which are abundant throughout the remainder of the individual, thus demonstrating the presence of a true ectoplasm and endoplasm, as in amœba.

The most careful examination with the best immersion lenses failed to reveal a nucleus until staining was resorted to. Brandt's method of staining living organisms was first tried, which consists in using a dilute watery solution of hæmatoxylin containing a very little alum. This brought into view a number of small round bodies, first colored pale, then a deep blue. By using other staining fluids, such as borax-carmine, alum-carmine and strong hæmatoxylin, after killing with some fixing reagent like chromic or picric acid, it was readily determined that individuals contained from one to several dozen of these bodies,

according to size. The proof that these were not pyrenoids or any protoplasmic bodies other than nuclei was demonstrated by their amœboid properties.

Close scrutiny further showed a reticulated arrangement of the protoplasm, which had also been observed by Cienkowski, Hertwig and Lesser. These investigators were unanimous in considering that it was due to numerous non-contractile vacuoles. Zopf was struck with their uniformity in size, and the fact that under the highest magnification they did not appear to change their form or size in the least, as vacuoles would be likely to do. He therefore surmised that they might be solid bodies instead of empty spaces, and upon crushing an individual found it to be so. By micro-chemical tests these were shown not to be starch, cellulin or cellulose, but paramylum.

We can only glance at the remainder of this very instructive and interesting investigation. Vampyrella vorax was found to possess several nuclei and numerous paramylum bodies; V. Spirogyræ, V. variabilis, V. pendula and Protomonas amyli each contain a nucleus and contractile vacuole, or sometimes two or three. It is therefore evident that Hæckel's monera group must either be characterized anew or these species excluded; it is even possible that what is true of these may be true of all other members of the group.

Studies upon five new closely related species are given in addition to the above, and the whole is summed up under the headings morphological, biological and systematic.

Aside from the important facts which this memoir contains it is worthy of careful examination for its explicit and suggestive methods.

NOTES AND NEWS.

DR. CHARLES E. BESSEY, Lincoln, Neb., desires to obtain dried or alcoholic specimens of various species of Cuscuta, either by purchase or exchange.

SZYSZYLOWICZ has published in Engler's *Jahrbuch* the first two parts of a paper on the systematic arrangement of the Tiliaceæ. It has not yet reached the genus Tilia which most concerns American botanists.

BENEDICT RÖZL died at Smichor, Prague, on Oct. 14 last, 61 years of age. He was an extensive collector, especially of orchids, and had traveled through the southern United States and other parts of North and South America.

THE DECEMBER NUMBER of *Queen's Microscopical Bulletin* appeared with a cover, a permanent acquisition which gives it more of a magazine appearance. Although a small journal, it contains valuable items for workers with the microscope.

THE POTATO ROT (Phytophthora) destroyed last year one-third of the crop in the State of Michigan, and a still larger proportion in New York. Michigan raises in prosperous seasons 9,000,000 bushels of potatoes. The importance of the thorough economic study of such a disease is sufficiently evident.

AT THE ANNUAL ELECTION of January 12, 1886, Mrs. E. Britton and F. J. H. Merrill were elected editors of the *Torrey Bulletin* for the coming year, to succeed Mr. W. R. Gerard. All exchanges or donations of papers or books for the club's library, are to be hereafter addressed "Torrey Botanical Club, Columbia College, New York City." Papers and notes for publication should be sent to the same address.

THE ITALIAN GOVERNMENT will open on March 2 an International Exhibition of apparatus for the application of remedies in solution, powder or mixture against animal and vegetable parasites of plants, especially the grape mildew. Prizes will be given as follows: One gold medal with $100, three silver medals with $30 each, and five bronze medals. A similar exhibition for southern France will be given February 15 to 17, under the auspices of the Central Agricultural Society of the Herault.

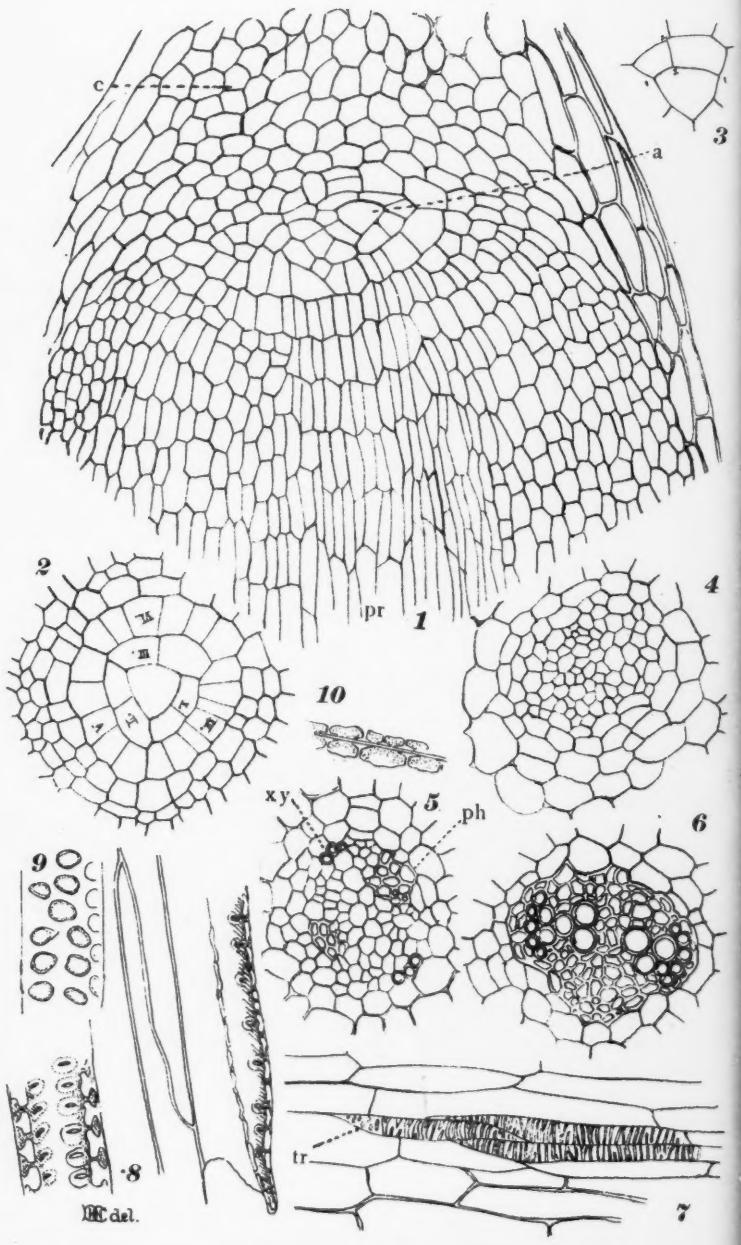
DR. W. T. THISELTON DYER, who has acted for some years as assistant director at the Kew Gardens, has been promoted to the directorate, to fill the place left vacant by the resignation of Sir Joseph D. Hooker. Dr. Dyer's name is familiar to botanical students in this country as one of the translators of Sachs' Text-book, and also in other ways. The position of assistant, which has become of almost as great importance as that of director, has been offered to and accepted by Mr. D. Morris, F. G. S., heretofore Director of Public Gardens, Jamaica.

PROTOPLASMIC CONTINUITY in the Fucaceæ continues to be a subject of investigation by Thomas Hick. In the *Journal of Botany* for December he gives his results with Himanthalia lorea and Laminaria digitata, at the same time apologizing for including the latter with Fucaceæ. The most effective agents for swelling, clearing, and even dissolving were necessary. In both these cases continuity of protoplasm was clearly made out for the cortical and central tissues, but not at all for the epidermal. In Himanthalia continuity is maintained by means of comparatively stout cords of protoplasm and also by sieve-plates, while in Laminaria it is chiefly through the intervention of sieve-plates.

THE EXISTENCE of Salvinia natans in this country has always been doubted. The only evidence that it grows in the United States is the statement of Pursh that he saw it in Western New York, but his collections which went to Lambert's herbarium contain no specimens of it. Recently, however, Mr. C. H. Demetrio has forwarded to Dr. Asa Gray specimens of genuine Salvinia natans collected in a bayou of Bois Brulé creek in Perry Co., Mo. Whether the specimens are native or accidental introductions remains to be determined. It is hard to believe them native, as the plant could hardly be confined to so limited a locality and is conspicuous enough not to be easily overlooked where it does grow; and it is equally difficult to understand how they could possibly be introduced.

THE GEOGRAPHICO-BOTANICAL EXPOSITION held in Copenhagen last April under the supervision of M. Carl Hansen met with excellent success, according to a lithographed account just received. It was held in the halls of the Royal Danish Society of Geography, and aimed to give an idea of the vegetation of different regions of the earth by grouping living plants from conservatories and the open ground in as natural relations as possible. These were fully labeled, and additional information given by means of charts, pictures, etc. Although no prizes were given, both amateur and professional cultivators gave all possible aid, and the public showed its appreciation by a good attendance. This is one of the first exhibitions of the kind yet attempted, and its success ought to stimulate similar exhibitions elsewhere.

RED SNOW was the subject of a paper by Romyn Hitchcock, before the Biological Society of Washington, which is printed in the December number of the *Amer. Micro. Journal*. Such snow was observed by De Saussure in Switzerland as early as 1760. The observations made by Captain Ross and the material brought by him from the Arctic regions in 1818 attracted special attention. It stained the snow deep crimson on the sides of cliffs eight miles in extent, and penetrated in places to twelve feet below the surface. It was then deemed of vegetable origin, but the affinities were not more closely determined. It has often been seen in recent years, and has been classed by different writers as a fungus, alga and lichen, and has at various times been placed in the genera Uredo, Palmella, Protococcus, Lepraria and Chlamydococcus, and its true position seems yet in doubt. Its growth and development has not yet been traced.



CAMPBELL ON BOTRYCHIUM.